DETAILED ACTION

Response to Amendment

The RCE amendment filed on 03/01/2010 has been entered and considered by the Examiner.

Claim Objections

1. Claim 8 is objected to because of the following informalities:

Claim 8 currently depends upon claim 7, which has been cancelled in the current amendment. For the purposes of examination, the Examiner assumes claim 8 depends from claim 1.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 1-2, 8-9, and 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakaguchi et al. (US Patent # 6,448,951) in view of Nauta et al. (US Publication # 2002/0030772).

As for claim 1, Sakaguchi et al. teaches:

1. An illuminator system (Fig. 1, #4, 8) *for a flat-panel display* (Fig. 1, #1)*, comprising:*

a slab waveguide (Fig. 4, #18) *disposed behind the display, the waveguide linearly tapered along a first axis* (Fig. 4, X-axis) *of the display and co-extensive with the display across the first axis and a second axis* (Fig. 4, Y-axis) *of the display, the waveguide comprising a thick end* (Fig. 4, left side end) *and an opposing thin end* (Fig. 4, right side end)**...***;*

a plurality of light sources (Fig. 4, sets of red, green, and blue LEDs) *each arranged to inject light into the input**...**of the waveguide, wherein the injected light emerges over a face of the waveguide* (Col. 6, line 65 – Col. 7, line 2)*.*

Sakaguchi et al. does not teach an input linear wedge.

In the same field of endeavor (i.e. backlights using light guides) Nauta et al. teaches:

an input linear wedge (Fig. 1, #13) *protruding directly from the**...**end of the waveguide* (Fig. 1, #15)*;*

a...light source (Fig. 1, #8)*...arranged to inject light into the input linear wedge of the waveguide* [0030]

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the waveguide of Sakaguchi et al. by adding the input linear wedge of Nauta et al., to ensure all light leaving the waveguide contributes to the light output of the illumination system (Nauta et al., [0030]).

Therefore the combination of Nauta et al. with Sakaguchi et al. teaches:
an input linear wedge (Nauta et al. Fig. 1, #13) *protruding directly from the thick end* (Sakaguchi et al. Fig. 4, left side end) *of the waveguide* (Sakaguchi et al. Fig. 4, #18)*; a plurality of light sources* (Sakaguchi et al. Fig. 4, sets of red, green, and blue LEDs) *each arranged to inject light into the input linear wedge* (Nauta et al. Fig. 1, #13) *of the waveguide, wherein the injected light emerges over a face of the waveguide* (Sakaguchi et al. Col. 6, line 65 – Col. 7, line 2).

As for claim 2, Sakaguchi et al. as modified by Nauta et al. teaches:
2. An illuminator system according to claim 1, in which each light source comprises a linear array of light sources configured to illuminate the input linear wedge of the waveguide (Each light source set of Sakaguchi et al. is an array of red, green, and blue diodes).

As for claim 8, Sakaguchi et al. teaches:
8. A display according to claim 1, in which the flat-panel display is a liquid-crystal display (Col. 5, lines 11-20).

As for claim 9, Sakaguchi et al. as modified by Nauta et al. teaches:

9. A display according to claim 2, wherein a scanning addressing circuit (Sakaguchi et al. Fig. 1, #8) *is synchronized with the row addressing circuit* (Sakaguchi et al. Fig. 1, #5) *of the display* (Sakaguchi et al. Col. 5, lines 57-59)*, the scanning addressing circuit configured to scan the injected light into the input linear wedge resulting in corresponding areas of the display being illuminated in turn* (Sakaguchi et al. Col. 5, lines 48-53)*.*

As for claim 12, Sakaguchi et al. teaches:

12. A method for illuminating a flat-panel display (Fig. 1, #1)*, comprising:*

injecting light from a light source (Fig. 4, LED(R), LED(G), LED(B)) *of a plurality of light sources* (Fig. 4, sets of red, green, and blue LEDs) *into an input...of a slab waveguide* (Fig. 4, #18) *disposed behind the display, the waveguide linearly tapered along a first axis* (Fig. 4, X-axis) *of the display and co-extensive with the display across the first axis and a second axis* (Fig. 4, Y-axis) *of the display, the waveguide comprising a thick end* (Fig. 4, left side end) *and an opposing thin end* (Fig. 4, right side end)*..., wherein the injected light emerges over a face of the waveguide based on the injection angle of the light source* (Col. 6, line 65 – Col. 7, line 2, the injection angle is zero, so the injected light from each LED group emerges over the face of the waveguide in the same horizontal region it was injected into)*; and*

scanning (Fig. 1, #8) *the injected light into the input...resulting in different areas of the display being illuminated in turn* (Col. 5, lines 48-53)*.*

Sakaguchi et al. does not teach an input linear wedge.

In the same field of endeavor (i.e. backlights using light guides) Nauta et al. teaches:

an input linear wedge (Fig. 1, #13) *protruding directly from the...end of the waveguide* (Fig. 1, #15)*;*

a...light source (Fig. 1, #8)*...arranged to inject light into the input linear wedge of the waveguide* [0030]

injecting light from a light source(Fig. 1, #8)*...into an input linear wedge* (Fig. 1, #13) *of a slab waveguide* (Fig. 1, #15) *disposed behind the display* (Fig. 1, #2)*, the input linear wedge protruding directly from the...end of the wave guide* [0030]*,*

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the waveguide of Sakaguchi et al. by adding the input linear wedge of Nauta et al., to ensure all light leaving the waveguide contributes to the light output of the illumination system (Nauta et al., [0030]).

Therefore the combination of Nauta et al. with Sakaguchi et al. teaches:
injecting light from a light source (Sakaguchi et al. Fig. 4, LED(R), LED(G), LED(B)) *of a plurality of light sources* (Sakaguchi et al. Fig. 4, sets of red, green, and blue LEDs) *into an input linear wedge* (Nauta et al. Fig. 1, #13) *of a slab waveguide* (Sakaguchi et al. Fig. 4, #18)
the waveguide comprising a thick end (Sakaguchi et al. Fig. 4, left side end) *and an opposing thin end* (Sakaguchi et al. Fig. 4, right side end) *with the input linear wedge* (Nauta et al. Fig. 1, #13) *protruding directly from the thick end of the wave guide,*

scanning (Sakaguchi et al. Fig. 1, #8) *the injected light into the input linear wedge* (Nauta et al. Fig. 1, #13) *resulting in different areas of the display being illuminated in turn* (Sakaguchi et al. Col. 5, lines 48-53).

As for claim 13, Sakaguchi et al. as modified by Nauta et al. teaches:

13. A method according to claim 12, wherein each light source comprises a linear array of light sources configured to illuminate the input linear wedge of the waveguide (Each light source set of Sakaguchi et al. is an array of red, green, and blue diodes).

5. Claims 3 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakaguchi et al. (US Patent # 6,448,951) in view of Nauta et al. (US Publication # 2002/0030772) as applied to claims 1-2, 8-9, and 12-13 above, and further in view of Wang (US Patent # 6,704,017).

As for claim 3, Sakaguchi et al. as modified by Nauta et al. teaches all the limitations of claim 1.

Sakaguchi et al. as modified by Nauta et al. does not teach a cylindrical mirror. In the same field of endeavor (i.e. backlights using light guides) Wang teaches:

An illuminator system (Fig. 2)*, further comprising a cylindrical mirror* (Fig. 2, #24) *configured to collimate the injected light* (Fig. 2, #23) *into the input...of the waveguide* (Fig. 2, #21), (Col. 3, lines 9-14).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the illuminator system of Sakaguchi et al. as

modified by Nauta et al. by adding the cylindrical mirror of Wang, to reflect the light from the light elements into the light guide (Wang, Col. 3, lines 11-14).

Therefore the combination of Wang with Sakaguchi et al. as modified by Nauta et al. teaches:

3. An illuminator system, further comprising a cylindrical mirror (Wang, Fig. 2, #24) *configured to collimate the injected light* (Fig. 4, sets of red, green, and blue LEDs) *into the input linear wedge* (Nauta et al. Fig. 1, #13) *of the waveguide* (Sakaguchi et al. Fig. 4, #18).

As for claim 14, Sakaguchi et al. as modified by Nauta et al. teaches all the limitations of claim 12.

Sakaguchi et al. as modified by Nauta et al. does not teach a cylindrical mirror. In the same field of endeavor (i.e. backlights using light guides) Wang teaches:

A method, wherein injected light from the...light source (Fig. 2, #23) *is collimated into the input...of the waveguide* (Fig. 2, #21) *by a cylindrical mirror* (Fig. 2, #24), (Col. 3, lines 9-14).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the illuminator system of Sakaguchi et al. as modified by Nauta et al. by adding the cylindrical mirror of Wang, to reflect the light from the light elements into the light guide (Wang, Col. 3, lines 11-14).

Therefore the combination of Wang with Sakaguchi et al. as modified by Nauta et al. teaches:

14. A method according to claim 12, wherein injected light from the plurality of light sources (Sakaguchi et al. Fig. 4, sets of red, green, and blue LEDs) *is collimated into the input wedge* (Nauta et al. Fig. 1, #13) *of the waveguide* (Sakaguchi et al. Fig. 4, #18) *by a cylindrical mirror* (Wang, Fig. 2, #24).

6. Claims 6, 11 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakaguchi et al. (US Patent # 6,448,951) in view of Nauta et al. (US Publication # 2002/0030772) as applied to claims 1-2, 8-9, and 12-13 above, and further in view of Higuchi et al. (US Patent # 5,887,964).

As for claim 6, Sakaguchi et al. as modified by Nauta et al. teaches all the limitations of claim 1.

Sakaguchi et al. as modified by Nauta et al. does not teach a prismatic film for guiding the emerging light towards the normal to the display waveguide.

In the same field of endeavor (i.e. backlights using light guides) Higuchi et al. teaches:

An illuminator system (Fig. 4)*, further comprising a prismatic film* (Fig.4, #4') *configured to guide the injected light emerging over the face of the waveguide* (Fig. 4, #1) *normal to the face of the waveguide* (Col. 8, lines 31-36).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the illuminator system of Sakaguchi et al. as modified by Nauta et al. by adding the prismatic film of Higuchi et al., to provide

whiteness and softness without degrading brightness (Higuchi et al., Col. 4, lines 56-61).

As for claim 11, Sakaguchi et al. as modified by Nauta et al. teaches all the limitations of claim 1.

Sakaguchi et al. as modified by Nauta et al. does not teach the waveguide being optically tapered via variation in refractive index.

In the same field of endeavor (i.e. backlights using light guides) Higuchi et al. teaches:

An illuminator system (Fig. 4)*, wherein the waveguide* (Fig. 4, #1) *is optically linearly tapered via variation in refractive index* Col. 1, line 60 – Col. 2, line 2)*.*

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the waveguide of Sakaguchi et al. as modified by Nauta et al. by making it have a variation in refractive index as taught in Higuchi et al., to increase efficiency of light utilization and uniformity in luminance (Higuchi et al., Col. 1, lines 57-59).

As for claim 17, Sakaguchi et al. as modified by Nauta et al. teaches all the limitations of claim 12.

Sakaguchi et al. as modified by Nauta et al. does not teach guiding the emerging light towards the normal to the display waveguide.

In the same field of endeavor (i.e. backlights using light guides) Higuchi et al. teaches:

A method, further comprising guiding (Fig.4, #4') *the injected light emerging over the face of the waveguide* (Fig. 4, #1) *normal to the face of the waveguide* (Col. 8, lines 31-36).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the illuminator system of Sakaguchi et al. as modified by Nauta et al. by adding the prismatic film of Higuchi et al., to provide whiteness and softness without degrading brightness (Higuchi et al., Col. 4, lines 56-61).

Response to Arguments

Applicant's arguments with respect to claims 1-3, 6, 8-9, 11-14, 17 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ROBERT E. CARTER III whose telephone number is (571)270-3006. The examiner can normally be reached on 9AM - 5:30PM Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sumati Lefkowitz can be reached on 571-272-3638. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Sumati Lefkowitz/
Supervisory Patent Examiner, Art Unit 2629

/R.E.C/